12-2017

Efficacy of Two HORTILED Fixtures

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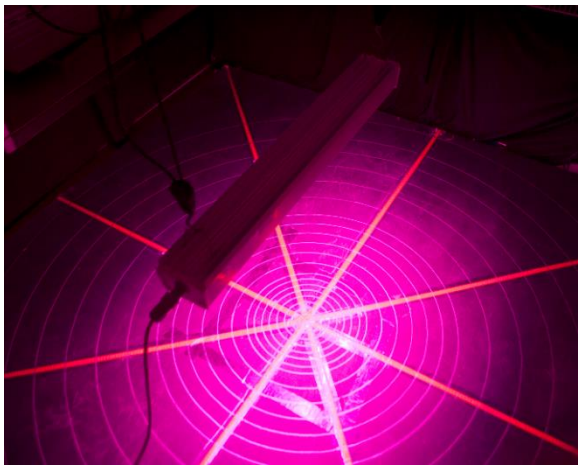
December 2017



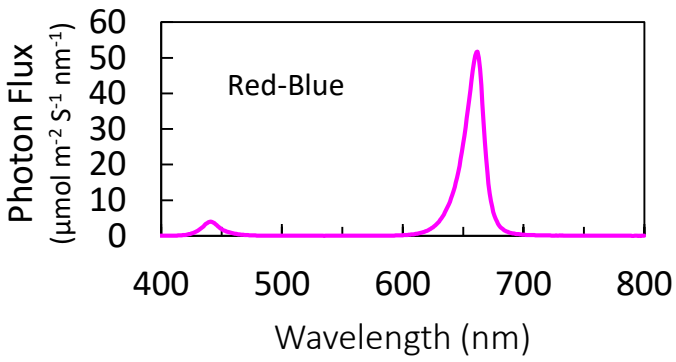
We tested the efficacy of the Full Spectrum and Red-Blue HORTILED TOP LED fixtures manufactured by PL Light. Both fixtures had an 80° light distribution.

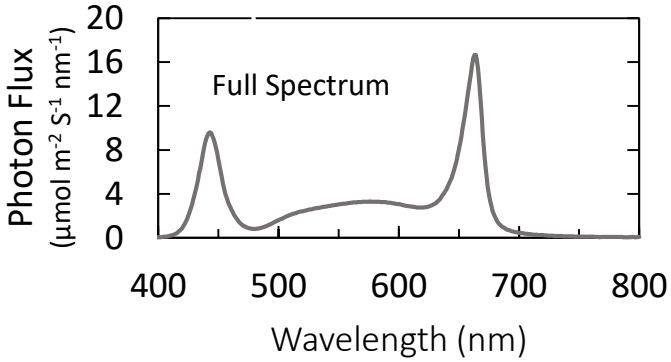
The efficacy of the fixtures was measured using flat plane integration as described by Nelson and Bugbee (2014)[1] (see adjacent photo). The fixtures were suspended at 0.65 m above the floor in a 3 × 3 m room with flat black walls. The photosynthetic photon flux density (PPFD, µmol · m^{-2}· s^{-1}) was measured with a recently calibrated quantum sensor (LI-COR model 190R). Measurements were made 2.5 cm apart near the center, increasing to 10 cm near the edge,and extrapolated to infinity using an exponential decay function.

Results

	Fixture Color	
	Red-Blue	Full Spectrum
Input (V/A/W)	**120/2.60/313**	**120/2.80/336**
Measured PPF(µmol/s)	771.9	642.5
Extrapolated PPF(µmol/s)	26.2	25.2
Total Output PPF (µmol/s)	798.1	667.7
Efficacy (µmol/J)	**2.55**	**1.99**

The fixtures both had a power factor of 1.00.
Spectral Output for the two fixtures is shown below (measured at 0.65 m).





Conclusions

The efficacy of the Red-Blue fixture (2.55) was 94.4% of the 2.7 µmol/J efficacy listed on the manufacturer's website. This is the highest LED efficacy we have measured to date. It surpasses the Philips red/blue Toplight fixture by 4 % (2.55/2.45).

The efficacy of the Full Spectrum light was not listed on the manufacturer's website. This efficacy (1.99) is 3 % less than a white light fixture from Fluence Bioengineering, which we measured at 2.05 umol J-1 in April 2017.

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[1] Nelson, J. A., & Bugbee, B. (2014). Economic Analysis of Greenhouse Lighting: Light Emitting Diodes vs. High Intensity Discharge Fixtures. Plos ONE, 9(6), 1-10. doi:10.1371/journal.pone.0099010